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EFFECT OF METHODS OF SOWING, VARIETIES AND SULPHUR LEVELS ON SPRING SUNFLOWER UNDER LOW HILL CONDITIONS OF HIMACHAL PRADESH *

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Sunflower cultivation has become very popular in Himachal Pradesh because of its short duration, photo insensitivity and wide apaptability. There is lot of variation in sowing methods of sunflower. The farmers generally follow flat method of sowing which results in poor yeild. The farmers sow varieties which are not tested throughly for their suitability.

Besides nitrogen, phosphorus and potassium, sulphur play a multiple role in nutrition of sunflower crop. In presence of sulphur, carbohydrates are fully utilized for the formation of oil (Yadav and Singh, 1970). Sulphur application results in significant increase in yield, crude protein and oil content of sunflower seed (Gangwar and Parmeswaran 1976). Keeping in view the above facts the present study was undertakent to find out the effect of method of sowing, varieties and sulphur levels on spring sunflower under low hill condition of Himachal Pradesh.

The experiment was conducted during the spring season of 1996 at farmer's fields in Panjawar village of Una district of Himachal Pradesh. Experimental plot was sandy loam in texture and alkaline in reaction (pH = 8.2), high in organic carbon (0.65%). The fertility of the soil was low in available nitrogen (219.52 kg/ha.) phosphorus (9.58 kg/ha) and sulphur (19.04 kg/ha) and medium in available potassium (214.20 kg/ha). Six combinations of two methods of sowing (flat and Ridge) and three varieties (Jawalamukhi, Mega - 363 and MSFH-8) in the main plots and three levels of sulphur (0, 20 and 40 kg/ha) in the sub plots were laid out in Split plot design with three replications.

The crop was sown on January 28, 1996. An inter-row spacing at 60 cm and an intra-row spacing of 30 cm was followed. Nitrogen through urea (46% N) and phosphorus through diammonium phosphate (18% N, 46% P_2O_5) was used to avoid additional quantity of sulphur. In the sub-plots sulphur as per treatment was applied through gypsum (18.6% S agricultural grade). Sunflower seed per hill were sown 5 cm deep in both flat and ridge method of sowing. The ridges were made from East to West direction and seeds were sown to the Southern aspect of the ridge.

At maturity, the yields of seed and straw were recorded. The seed samples were dried to 10% moisture levels and oil was extreacted by using Nuclear Magnetic Resonance Technique (Tiwari et al 1974).

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Effect of methods of sowing

Ridge method of sowing gave significantly higher seed and straw yielld which were 8.12 and 5.0 per cent more than flat sowing (Table -1). Ridge method resulted in 8.44% more oil yield than flat method of sowing. The difference in oil and protein content in both the methods of sowing were not significant. The improvement in seed yield under ridge method of sowing could be attributed due to better germination and higher plant population under ridge method of sowing. The other major contribution for higher yield in ridge method was significantly higher 1000 seed weight and higher head diameter over flat sowing. These results are in confirmity with those obtained by Firake et al. (1994).

Effect of varieties

Variety MSFH-8 produced 4.89 and 10.02 per cent higher seed yield than the varieties Jawalamukhi and Mega 363 respectively. The increase in seed yield with variety MSFH-8 was atrributed to increased head diameter, number of seed per head and 1000-seed weight (Table 1). Variety MSFH-8 yield 14.80 and 8.64 per cent higher oil than Mega-363 and Jawalamukhi varieties. This may be atributed to significant higher oil content in seed and higher seed yield of MSFH-8 than Jawalamukhi and Mega-363.

Effect of sulphur levels

The seed yield increased significantly and consistently with each increment of sulphur upto 40 mg/ha. The per cent increase at 40 kg/ha was 4.88 and 31.37 per cent over 20 kg/ha and control, respectively. The yield per hectare increased significantly and consistently due to significant and consistent inrease in head diameter, number of seed per head and 1000 seed weight with increase in sulphur fertilization. In the present study 40 and 20 kg/ha sulphur increased head diameter by 18-29 and 12.81 per cent, number of seeds per head by 23.44 and 18.29 and 12.81 per cent, number of seeds per head by 23.44 and 18.68 per cent and 1000 seed weight by 18.75 and 13.11 per cent over control. Such results have also been reported by Kameswar rao and Gangasran (1991) and Prabhuraj et al (1993). Sreemannarajanat Raju (1994) also observed the response of sunflower up to 40 kg/ha.

Application of 40kg/ha enhanced significantyl oil content and oil yield of sunflower. Each increment of sulphur increased oil content by 6.23 and 9.22 per cent over control. This was due to full utilization of carbohydrate for the synthesis of oil with sulphur nutrition (yadav and Singh, 1970). Sulphur might have influenced rapid conversion of nitrogen to crude protein and finally to oil. The acetic thiolinase, a sulphur based enzyme in the presence of sulphur converts acetyl COA to Melonyl COA rapidly resulting in highe oil content in sunflower (Bonner and Verner 1965). Increased oil yield is obtained either by increasing seed yields or oil content in the seeds or by both. In the present study both seed yield and oil content were increased significantly by sulphur application compared to control.

Increase in protein content due to sulphur application might be due to the fact that sulphur is an essential constituent of sulphur containing amino acids viz. Cystine, cystein and methionine. Thus the increase in protein content due to suphur fertilization is obvious as presented in Table 1.

REFERENCES

Gangwar, M. S. And Parmeswaran, P. M. (1976). Oilseed J. 6 : 28-32.

Jadav, R. and Singh, D. (1970). J. Indian Soc. Soil Sci. 18 : 183-186.

Bonner, J. and Verner, J. E. (1965). Information about sunflower cultivars. Informations - Agricollas - Ganderas - Granjeras. 1 15-16.

Tiwari, P. N., Gambhir, P. N. and Rajan, T. S. (1974), Americal Oil Chemists' Society. 51 : 104-109.

Firake, N. N., Gutal, G. B. and Bangal, G. B. (1994). J. Maharastra Agric. Univ. 19 : 442-443.

Kame Wararao, S. V. C. and Gangsaran (1991). Indian J. Agron. 36 : 95-98.

Prabhuraj, D. K., Badiges, M. K. and Manure, G. R. (1993). Indian J. Agron 38 : 427-430.

Sreemannarayana, N. and Raju, A. S. (1994). Indian J. Agric. Sci. 64 (147-151.

Table 1 . Effect of methods of sowing, varieties and sulphur levels on yield attributes, yield, oil and protein content of spring sunflower under low hill conditions of Himachal Pradesh.

Treatments	Head diameter (cms	No. of seeds per head	1000-seed weight (g)	Seed yield (g/ha)	Straw yield (g/ha)	Oil yield (g/ha)	Oil content (%)	Protein content (%)
Method of sowing								
Flat	19.85	1095.65	49.63	24.76	76.26	10.66	42.78	16.57
Ridge	20.46	1146.92	52.65	26.78	80.08	11.56	42.96	16.60
CD (0.05)	N. S.	N. S.	1.89	1.26	2.49	0.55	N. S.	N. S.
VARIETIES								
Jawalamukhi	18.87	1010.13	52.97	25.75	76.22	10.99	42.47	16.42
Mega-363	20.58	1173.76	38.90	24.55	76.74	10.40	42.21	16.53
MSFH-8	21.02	1179.97	61.56	27.01	81.54	11.94	43.93	16.81
CD (0.05)	0.95	64.52	2.33	1.54	3.06	0.66	0.32	0.16
Sulphur levels kg/ha.								
0	18.26	983.24	46.33	21.68	66.64	8.85	40.77	14.37
20	20.60	1166.92	52.29	27.14	82.35	11.79	43.31	17.33
40	21.60	1213.70	54.90	28.48	85.50	12.70	44.53	18.06
CD (0.05)	0.47	38.92	1.02	0.61	1.05	0.26	0.20	0.15